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SCIENCE NEWS LETTER

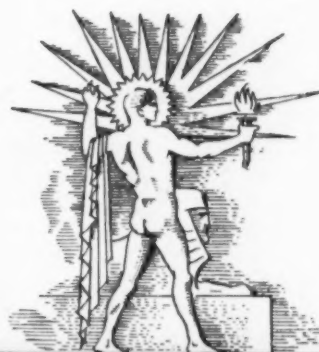
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THE WEEKLY SUMMARY OF CURRENT SCIENCE •



June 29, 1940

Industrial Fireworks

See Page 410

A SCIENCE SERVICE PUBLICATION

Do You Know?

Substitutes for the rubber and rosin in adhesive plaster are the goal of a laboratory investigation.

Says the Department of Agriculture: In the few areas where *beavers* are plentiful, erosion is usually under control.

Philadelphia's Franklin Institute is exhibiting a *key* found in the ruins of Herculaneum, Roman city destroyed in 79 A.D.

Spaniards in the New World settled as far north as British Columbia and even touched Alaska, is the report from recent investigations.

Making a *pendulum* out of a turnip and a piece of thread is a sample of the ingenuity that China's refugee school teachers practise.

Indians who made rubber balls called the source of the material caoutchouc (pronounced koo-chook) meaning the *crying tree*, because they thought the tree cried when cut.

Pronounced by an anthropologist a sculptor of *natural genius*, a woman of Pitta-Pitta tribe in Australia produces human figures in clay in a style recalling the art of ancient Egypt and Sumeria.

Britons are told how to recognize enemy *parachutists*: a British pilot descending to save himself is generally alone and his machine burning, whereas airplanes dropping troops move at low heights, usually preceded by reconnaissance planes and parachutes descend in groups of 10 to 40.

QUESTIONS DISCUSSED IN THIS ISSUE

Most articles which appear in SCIENCE NEWS LETTER are based on communications to Science Service, or on papers before meetings. Where published sources are used they are referred to in the article.

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What is the length of life of a mesotron? p. 408.

PHYSIOLOGY

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PSYCHOLOGY

Why do gifted children seldom grow up to be famous men? p. 410.

PUBLIC HEALTH

Why would a public health program save money for America? p. 409.

Starting July 1, Japan will issue *ration* tickets for sugar and matches.

Two *gold coins* of Alexander the Great were among 1,167 coins in a hoard found in India, apparently hidden about 317 B.C.

When hunted, *mourning doves* fly with amazing speed, but when migrating these birds do not travel faster than 35 miles an hour.

Visitors to Vicksburg National Military Park in Mississippi can see how some features of modern *warfare* were evolving in Civil War days.

Bolivia is stepping up oil production and enlarging oil refineries.

The earliest *marine mine* is believed to have been an "explosion ship" with which the Dutch destroyed a boat bridge in 1585.

The *Ivory gull*, an Arctic bird very rarely seen in New England, has recently been observed at Acadia National Park in Maine.

A nation-wide census of engineers and architects for *national* defense purposes is being made by professional organizations in the United States.

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GENERAL SCIENCE

National Defense Research Committee Sets To Work

Will Work Through Organized Scientific Laboratories In Universities and Industry to Solve Defense Problems

AERICAN science and technology can "cut rings around any other country on earth," given sufficient time, Dr. Vannevar Bush, chairman of the new National Defense Research Committee, affirmed in his first press conference since President Roosevelt announced the new Committee.

Charged with solving problems encountered in this nation's rush to arm, the NDRC will devote its major attention to "instrumentalities" needed by the defense program.

Because the work of the Committee will be highly confidential, definite projects to be considered will not be made public.

To the defense preparations, the Committee will bring the energies and expert knowledge of the best-equipped scientists of the nation. For instance, if a new weapon should be under development, the best brains in physics, mathematics, chemistry, and engineering can be concentrated upon it so far as they are needed.

In general, the new Committee will work through the best organized scientific laboratories and groups in leading laboratories, both in universities and industry. Since research today is a matter of the coordinated effort of many persons, problems are likely to be turned over in most cases to groups of scientists who have been used to working together.

There will be ample opportunity for new ideas and suggestions to get a hearing by the committee or agencies connected with it. The mere announcement of the Committee brought to Dr. Bush's desk some 200 research defense suggestions from scientists.

A little later, under the direction of Commissioner of Patents Conway P. Coe, a Committee member, a mechanism will be set up to provide a clearing house for all the suggestions that individual inventors and others may wish to make. During the last World War, Dr. Bush recalled, some 2,000 such ideas and inventions were submitted each week to the joint Army-Navy board handling inventions.

The NDRC will not duplicate what the Army and Navy are already doing in research, and it will not concern itself with aviation because research in that field is being handled by the National Advisory Committee for Aeronautics, the government agency of which Dr. Bush is also chairman.

Medicine and food are other fields outside the activities of the NDRC. Existing agencies, such as the appropriate divisions of the National Research Council and government agencies, will handle such problems.

With Dr. Bush, who is president of the Carnegie Institution of Washington, as chairman, the National Defense Research Committee has eight members. Two, representing the War and Navy Departments, are not yet named. The others are: Commissioner of Patents Coe, representing the Commerce Department; Dr. Frank B. Jewett, president of the National Academy of Sciences and president of Bell Telephone Laboratories;

President James B. Conant of Harvard University; President Karl Compton of Massachusetts Institute of Technology, and Dr. Richard C. Tolman of the California Institute of Technology.

Offices of the NDRC will probably be established at the administration building of the Carnegie Institution of Washington in Washington.

The new National Defense Research Committee is the fourth major group called into existence to aid the government in times of emergency. The National Academy of Sciences was created by Congress at President Lincoln's request during the Civil War and it has continued as a "senate" of science, election to which is one of the highest honors in American science. The National Research Council was created during the World War as a government agency and continues today as a part of the Academy. The Science Advisory Board was appointed by President Roosevelt in 1933, made effective reports on scientific research by the government and then went out of existence. Now the National Defense Research Committee is formed to play its part in the present situation.

Science News Letter, June 29, 1940

There are 3,000,000 *Italians* in Argentina and 2,000,000 in Brazil.

Dresses worn by Navajo Indian women are said to be a *style* inspired by fashions of the 1860s worn by Army officers' wives.



"FLYING FORTRESS"

This "Flying Fortress," largest airplane in the service of the U. S. Army, officially known as the B-17 heavy bomber, was recently shown in Washington. Made by the Boeing Aircraft Company, the ship weighs thirty tons, has a wing spread of 150 feet and is powered by four engines of 1,000 horsepower each. It carries a crew of eleven, and full living quarters are provided on board. Machine guns are mounted in blisters on the fuselage, and a large load of bombs can be carried. Air Corps officials state that this is larger than any plane now in use in the European war.

MEDICINE

New Kind of Vaccination Will Prevent Lockjaw

Toxoid May Be Given in Advance to Protect Against Injuries of War, Automobiles, and Fourth of July

ON M-Day the men of our fighting forces will probably be rapidly turned into walking factories of tetanus, or lockjaw, antitoxin. Then, if wounded, they need not as in the past depend for protection against lockjaw on the speed with which they can be taken to dressing stations for injections of this antitoxin.

This new kind of protection against lockjaw, or tetanus, that takes effect before the danger of tetanus germs getting into wounds arises is due to development within the past few years of a tetanus toxoid.

The tetanus toxoid, unlike the antitoxin, is made directly from the germs themselves. The poison or toxin of the germs is treated with formalin and heat so that it cannot produce disease but still has the power of stimulating the body to produce its own defense against the tetanus germs.

In this it is like the diphtheria toxoid which has protected thousands of children against diphtheria. Many baby doctors are now giving tetanus toxoid with diphtheria toxoid to six-months-old babies. When these infants reach the run-about age, their mothers need not worry about the danger of stepping on rusty nails. Such an injury now means the child should be rushed to the doctor for injections of anti-toxin to protect against any tetanus germs that may have been driven into his foot. The child who has had tetanus toxoid, however, already has such protection.

All the midshipmen at the U. S. Naval Academy have now been given this new type of tetanus vaccination. Medical officers of the Army and Navy believe, though it has not yet been officially stated, that this vaccination will be given, along with "shots" of antityphoid fever vaccine, to all men drafted for the services on M-Day.

The tetanus toxoid has been given to all French soldiers and, according to reports received by medical officers of the U. S. Army, there has been no tetanus in the French army since the start of the war in September. Men of the Italian army have also been given this protection, but no reports of its success

have been received. Up to two years ago the Germans had not adopted the procedure but there has been no direct word since then on the subject.

Peacetime counterparts of war wounds—automobile accident injuries and Fourth of July casualties—also bring danger of lockjaw. For protection against these, doctors now rely on injections of tetanus antitoxin. The new tetanus toxoid can also be used at the time, it is claimed, of injury to reenforce the antitoxin.

One important advantage of toxoid over antitoxin is the fact that toxoid is not made from horse serum. Antitoxin is made from the blood serum of horses that have been given immunity to tetanus. Although this is effective, it sometimes makes people sick with what is called serum sickness. Those who suffer from allergy, or who have had previous injections of horse serum, are particularly likely to develop severe serum sickness.

Science News Letter, June 29, 1940

PHYSIOLOGY

Chewing While Talking Aids Deaf to Speak

CHEWING and talking at the same time—frowned on by etiquette books—is an effective new method of helping deaf people to overcome unnatural speech, Dr. Emil Froeschels reported to the American Association for Promoting the Teaching of Speech to the Deaf.

Formerly one of the University of Vienna's notable physicians, Dr. Froeschels is now applying his methods of improving speech at the Central Institute for the Deaf in St. Louis.

Over-exertion of muscles is responsible for many defective voices, both among deaf and hearing people, Dr. Froeschels said. Since voice muscles cannot be used so actively when a person tries to eat and talk at the same time, Dr. Froeschels evolved the practise method of having speech patients make simple chewing movements while articulating words.

"What then proceeds from the mouth," he said, "is a language—which is, to be sure, no longer in use—but which in

my opinion was the primitive language of man."

Accustoming deaf patients to talk with less muscular force and stiffness, the chewing practise leads to more flowing and natural speech, he explained, thus correcting the tendency of the deaf to split speeches up into isolated words and sounds.

To demonstrate his method, the Viennese physician asked the Rhode Island School for the Deaf to bring to the meeting two boys and two girls particularly in need of voice improvement.

Science News Letter, June 29, 1940

PHOTOGRAPHY—PHYSICS

X-Ray Pictures Taken In Millionth of a Second

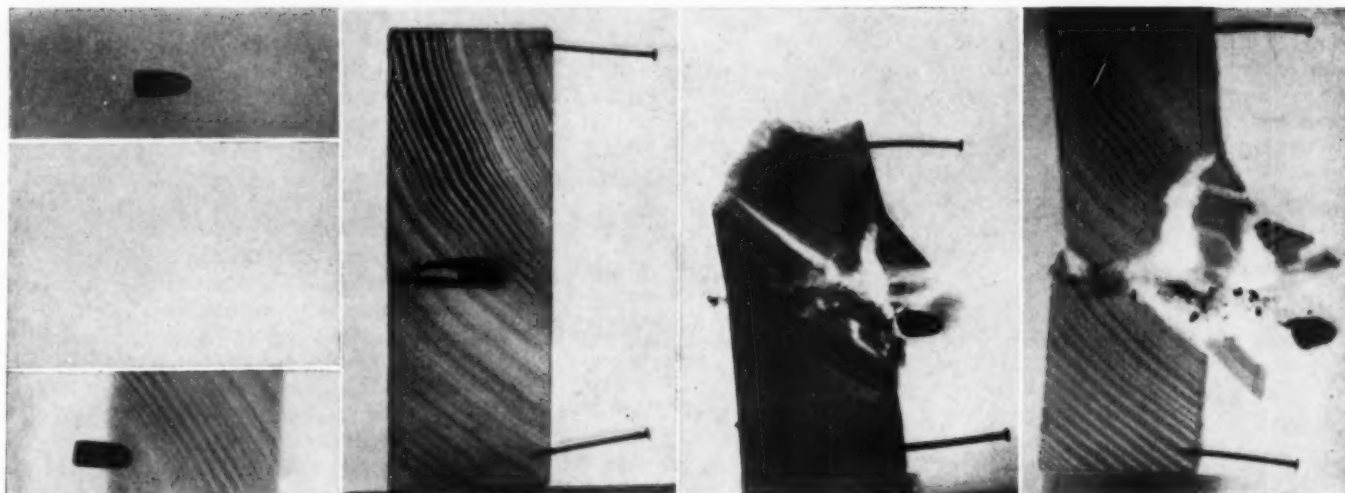
X-RAY photographs taken with an exposure short enough to show a moving bullet while passing through a block of wood were shown to members of the American Physical Society at Pittsburgh. The method was described by Dr. Charles M. Slack, research physicist for the Westinghouse Lamp Division, who developed the new X-ray tube with the collaboration of his associates.

A very brief electrical surge of high voltage and amperage is obtained by charging a condenser, in several seconds,



SHOOTING AN X-RAY

As Dr. Charles M. Slack stands at the control switch, his associate, L. F. Ehrke is about to fire a rifle that will take an X-ray picture of the bullet going through wood.



SPEED X-RAYS

These photographs, taken at a millionth of a second permit the scientist to look through a block of wood and see the damage done by the bullet on its way through. The two pictures at left show the bullet in the air and entering the wood. The others show how the wood "seals" itself after the bullet has entered and show the shattering action of the bullet as it makes its way out.

and discharging it through the X-ray tube. The voltage is about 100,000, somewhat less than that often used in ordinary tubes. But the current is far greater. The ordinary tube takes about half an ampere, this new tube uses about 2,000 amperes.

In use, the bullet, golf ball, or other object being studied, is made to break a fine tungsten wire. This is connected to a timing circuit, which releases the energy stored in the condensers.

Possible practical applications of high-speed X-rays are in studying internal strains in rapidly moving machine parts, detection of slight deflections in a bullet passing through a gun barrel, or finding out what happens to the bones in a football player's foot as he kicks the ball.

Science News Letter, June 29, 1940

● RADIO

Recent experiments on dental caries will be described by Dr. J. R. Blayney, director of the Walter G. Zaler Dental Clinic of the University of Chicago, speaking as guest scientist on "Adventures in Science" with Watson Davis, director of Science Service, over the coast to coast network of the Columbia Broadcasting System, Thursday, July 4, 4:00 p.m., EDST, 3:00 EST, 2:00 CST, 1:00 MST, 12:00 PST.

Listen in on your local station. Listen in each Thursday.

PHYSICS

Water Softening Method May Separate Uranium 235

Patent Is Issued for Running Potassium Chloride Through Zeolite and Then Salt, Increasing Isotope

POSSIBILITY that a method essentially similar to that now widely used for softening water may provide a new means for separating the uranium isotope of weight 235, hailed as a source of practicable atomic power, is foreseen in a patent just granted. The patent, number 2,204,072, has been given to Dr. John G. Dean, director of the laboratory of the research division of the Permutit Company at Birmingham, N. J.

Dr. Dean's method makes use of interesting substances called zeolites. These are chemical compounds containing aluminum, calcium and sodium in combination with silicon. The material looks like sand, except that it is green in color, so it is sometimes called "greensand." Hard water contains calcium and magnesium salts. When this is passed through a zeolite, calcium or magnesium is taken out and sodium put in. Thus, if the water has calcium sulphate in solution before it passes through the zeolite, it has sodium sulphate when it comes out.

When the zeolite has given up all of the sodium, it is no longer effective, but it can be regenerated. This is done by passing through it a strong solution of ordinary salt, which is sodium chloride. Then the reverse of the softening process takes place. The solution is changed to one of calcium chloride, and sodium is put back into the zeolite.

Dr. Dean's patent applies this to the separation of isotopes, which are elements very similar chemically and physically, but with atoms of different weights. Ordinary potassium, for instance, contains three isotopes, of atomic weight 39, 40 and 41; 40 is in extremely small amounts. Of the others, number 39 is a little more than 14 times as abundant as 41.

He passed a 2% to 3% solution of potassium chloride through a 35-inch column of zeolite. In the solution which emerged, the 39 isotope was even more plentiful than normally. But when a salt solution was passed through to regenerate the zeolite, it yielded a potassium chloride solution in which the percentage of the rarer isotope was increased about 5%. By further passages, the percentage could probably be enlarged still more.

In the case of lithium solutions, he increased the relative abundance of the rarer isotope about 9%. With nitrogen compounds, the increase was about 10%.

Uranium of atomic weight 235 makes up about one one-hundred-fortieth of ordinary uranium, the rest being an isotope of weight 238. The former is the one believed to be a possible source of atomic power, if it can be separated in sufficiently large quantities. One method already used to separate it, however, the mass spectrometer, is exceedingly slow, so it is estimated that 75,000 years would be

needed to secure a pound of the stuff. Another method, that of thermal diffusion, may speed this up about 11,000 times, but even this would be too slow to be of value.

Dr. Dean stated to Science Service that he saw no reason why his method could not be applied as successfully to uranium

as to lithium, potassium and nitrogen. He said that he does not have the facilities for making these tests, but that material has been supplied to Dr. H. C. Pollock, of the General Electric Company's research laboratory at Schenectady, N. Y., where the method will be tried.

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AERONAUTICS

Airplane Engine Production To Pass 25,000 By December

Huge New Plant Additions Will Enable "Big Three" Producers to Speed Up Their Output Substantially

AMERICA'S capacity to build all-important aircraft engines is rising at phenomenal rate. At the end of last year it stood at 16,000 a year. By December it will pass 25,000.

The Wright Aeronautical Corporation marked still another milestone in aviation progress as it strives to bring into full production at Paterson, N. J., the fourth major motor plant addition since the start of the war.

Oldest and largest of the "big three" engine producers, its new plant adds 540,000 square feet to the company's facilities, bringing to 2,300,000 square feet the area it is devoting to building engines. This is more than double the space available one year ago. Still another plant is already in preparation. A nearby dyeing building (Paterson is a noted textile center) has been taken over.

Besides Wright, both of the other "big three" producers have also increased capacity substantially.

Allison, builders of the new streamlined, liquid-cooled engine, completed a second factory in Indianapolis scarcely was its initial one completed.

Pratt and Whitney, of East Hartford, Conn., has tripled its facilities in the last 18 months. One plant addition went into service early this spring and another has already been started. Pratt and Whitney's capital investment has climbed from \$7,000,000 to \$27,000,000 during that period. The major part of expenditures for the new plant has been paid for by the Allies. Wright's new plant number two is one such Allied-subsidized addition.

Exact figures on production are not being given out these days but known constants of production engineering enable one to guess that Wright alone

should be able to build close to one thousand per month by the end of the year. So should Pratt and Whitney. Allison's output will be smaller for some time. This firm only recently began production and as was to be expected with any new power plant, it has been having its difficulties. However, these are now reported to be largely solved.

Wright takes important steps toward rationalized engine building in its new factory, which is entirely devoted to manufacturing parts. All assembly work is done in the original plant, where 150 test stands, two-thirds of which are generally in use, provide an ear-splitting background. Plant number two is laid out in twelve double lines broken by three cross aisles. The whole lends itself to easier flow of the thousands of parts necessary for an airplane.

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ASTRONOMY

Layer of Lava on Moon Would Explain Cooling

IF THE surface of the moon were covered with a layer of lava about an inch thick, its rate of cooling at a lunar eclipse would be explained. Reporting on observations made from the Mt. Wilson Observatory on October 27, 1939, when the moon entered the earth's shadow, Dr. Edison Pettit, of the Observatory staff, draws this conclusion.

The measurements were made by a thermocouple, which changes the heat radiation from the moon into electricity. It was attached to a 20-inch reflecting telescope. These showed that at the beginning of the eclipse the temperature of a point on the lunar surface where the sun was directly overhead was 208 de-

grees F., just below the boiling point of water on earth. While the moon was entering the shadow, the temperature dropped rapidly, so that when the eclipse was total, the temperature was 98 degrees below zero, F. While the moon was in the shadow, the temperature continued to drop, rapidly at first, then more slowly, until just at the end of the total eclipse, it had reached 144 degrees below zero, F. As the moon left the shadow, the temperature returned to normal.

From these data, Dr. Pettit was able to calculate the ratio between the radiation that the moon receives, from the sun, and that which it sends out again into space. He found that the two were nearly proportional, showing that the moon's surface is able to hold its heat for a very brief period. This is characteristic of materials like volcanic lava, of which the moon's surface is supposed to be made. Knowing how lava does "hold its heat," he found that a layer 2.6 centimeters (about one inch) thick would respond the way the moon's surface did on this occasion. These results are similar to observations which he made of a lunar eclipse in 1927.

Dr. Pettit's report appears in the *Astrophysical Journal*.

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PHYSICS

Northern Lights Copied by Current Through Nitrogen

WHAT they described as "the most faithful reproduction of the auroral spectrum so far achieved" has been obtained by passing electrical discharges through long tubes filled with nitrogen at low pressures, Dr. Joseph Kaplan, of the University of California at Los Angeles, and Dr. Sidney M. Rubens, of the University of Southern California, announced to the meeting of the American Physical Society.

In order to get the maximum effect, the tubes were viewed from the end, so that the light came from a great thickness of gas. The pressure was about one-fiftieth to one seventy-fifth of that of the atmosphere.

The light was analyzed through the prisms of a spectroscope. They found that after the current was disconnected, there remained an after-glow in the tube, similar to the actual aurora, or northern lights. Even though the glow faded as time passed, at first the band in the spectrum corresponding to wave length 3467 increased in brilliance. They interpret these effects as due to changes in the nitrogen molecules.

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ASTRONOMY

Summer in the Sky

Low in the South on July Evenings You Can See Constellation Most Typical of Season, Scorpius

By JAMES STOKLEY

LOW in the southern sky on July evenings we can see the constellation that, perhaps more than any other, suggests summer to those who know their stars. Just as the three stars of Orion's belt, and those nearby, dominate the winter evening, so does the curved tail of Scorpius, the scorpion, shine to the south at this time of year.

Unfortunately it is that the scorpion is always low in the heavens, where the greater amount of air through which the light of its stars must penetrate makes them dimmer than if they were higher. From a point in the southern hemisphere, or in the tropics, the scorpion is much higher, and its beauty can be better appreciated.

On the accompanying maps, we see the arrangement of the summer evening stars, as they are at 10:00 p.m. (standard time) on July 1, or 9:00 p.m. on the 15th. Scorpius is right over the south point of the horizon. Its brightest star is Antares, red in color, from which fact comes its name. This means "rival of Mars," for the planet is also red. We cannot now compare them, because Mars is not in a good position to be seen at all this month.

To the left of Scorpius is Sagittarius, the archer, a group resembling a teapot in outline. The spout is next to the curved tail of the scorpion, and the handle is indicated by four stars in a little quadrilateral to the left. These four stars, by the way, form the bowl of the "milk dipper," perhaps the least familiar of heaven's three dippers.

The most prominent dipper is the great one, part of Ursa Major, the great bear, which we see to the northwest. The lowest stars in the big dipper are the pointers, which show the way to the pole star. This, in turn, is at the end of the handle of the little dipper, part of Ursa Minor, the lesser bear.

By following the curve of the big dipper's handle southward, we come to the bright star Arcturus, in Bootes. And then, continuing the curve farther, we reach Spica, brightest member of Virgo, the virgin.

High in the east is the most brilliant star of the summer evening: Vega, in

Lyra, the lyre. Below it is one end of the figure of Cygnus, the swan. The most prominent stars of this figure form the "northern cross," now seen lying on its side, and which has Deneb at the top. To the right of Cygnus may be found Altair, in Aquila, the eagle. This has two fainter stars which attend it directly above and below.

No planets are now visible in the evening, but two can be seen in the morning, before sunrise. Jupiter appears soon after midnight, in the constellation of Aries, the ram. Far brighter than any other star or planet then visible, one can find it readily. Just below it is Saturn, considerably fainter, though equaling a first magnitude star. Venus is gradually coming into the morning sky. By July 15, it will rise about an hour and a half before the sun, and will be even more brilliant than Jupiter.

Where the constellations originated, no one can say for sure. It is believed, however, that they originated in one place. In a recent report to the British Astronomical Association, Mrs. A. S. D. Maunder, recognized as an authority on the history of astronomy, said:

"The whole of the old 47 constellations, as described in the *Phenomena* of Aratos, were devised as a complete system, at one epoch, by those astronomers who were named by Aratos as of the Elder Race. They were not a gradual aggregation of constellations admitted somewhat haphazardly into the number. At present, we know no more about the Elder Race than that they lived in Europe, in latitude be-

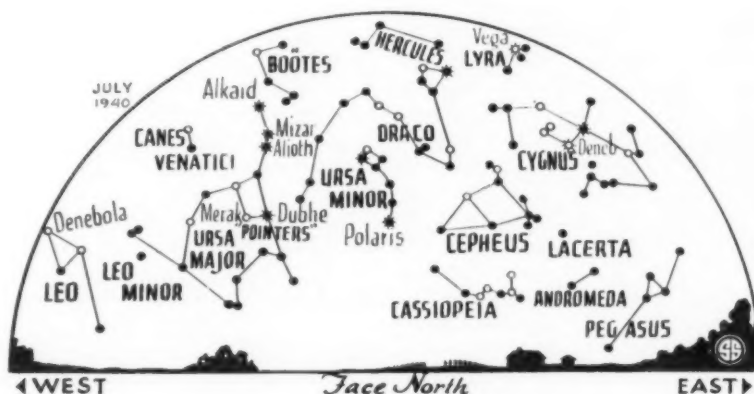
tween 37 and 38 degrees north—that is, in the Mediterranean region. The epoch was very close to 2900 B.C., between 3000 and 2800 B.C."

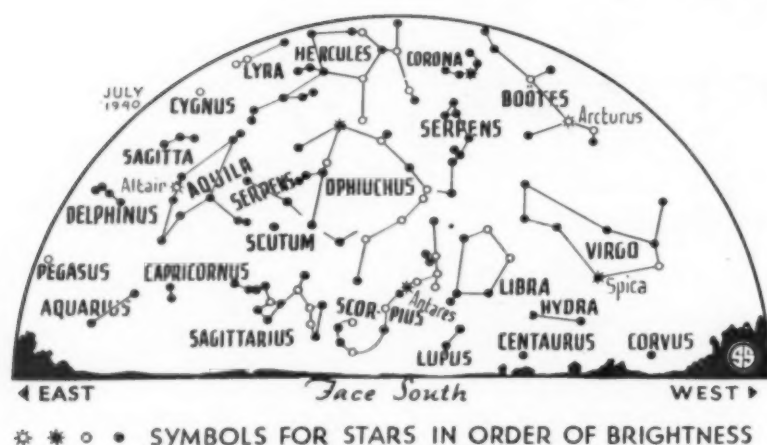
According to Mrs. Maunder, they had considerable knowledge of astronomy, and recognized a calendar based on the sun and moon, which had at least 12 months. Occasionally, as with other early calendars, a thirteenth month was added to keep the reckoning straight, just as we have an extra day every leap year. Thus they must have recognized the part of the sky in which the sun moves through the year, the zodiac, and so divided it into 12 constellations, one for each month. It happened that there were four bright stars near the place where the sun was at the beginning of each season.

These four, on this account, have since been known as the "royal stars," and they are: Regulus, Antares, Fomalhaut and Aldebaran. Only the second is visible these July evenings. Antares marked the sun's position at the beginning of autumn.

To the right of the scorpion is a group which they called "the claws of the scorpion," regarding it, however, as a separate constellation. Thus, even then, there were twelve constellations in the zodiac, the same that we have at the present day.

There is a very slow wobbling of the earth's axis, by which the constellations seem to slip once around the zodiac every 26,000 years. One result of this, incidentally, is that in the year 15000, the scorpion will appear high in the winter evening sky, and Orion low in the summer. This change meant that, around 700 B. C., the sun was not in the scorpion at the beginning of autumn, but in the neighboring "claws of the scorpion."





It was then, suggests Mrs. Maunder, that this constellation was given its present name, Libra, the scales. The reason is rather obvious, because at this time of year day and night are equal in length. But they still kept on calling the two principal stars in the figure "the northern claw" and "the southern claw." These names survive in those which the stars bear today. They are Arabic, "Zuben Eschamali" and "Zuben Elgenubi." The first part, "zuben," means claw, while "eschamali" and "elgenubi" mean northern and southern, respectively.

Thus, in the stars we see overhead in the evening, we have the world's oldest picture book, where men have preserved the old stories, and also have recorded the knowledge of ages now past and forgotten.

Celestial Time Table for July

Thursday, July 4, 5:00 a.m., Earth farthest from sun, distance 94,239,000 miles; 8:11 a.m., Moon passes Venus. **Friday, July 5, 6:28 a.m.,** New moon. **Saturday, July 6, 5:20 p.m.,** Moon passes Mars; 9:02 p.m., Moon passes Mercury. **Tuesday, July 9, 2:00 p.m.,** Moon nearest, distance 228,800 miles. **Friday, July 12, 1:35 a.m.,** Moon at first quarter. **Friday, July 19, 4:55 a.m.,** Full moon; 8:00 a.m., Venus nearest sun. **Sunday, July 21, 12:00 p.m.,** Mercury between earth and sun. **Wednesday, July 24, 12:00 p.m.,** Moon farthest, distance 251,400 miles. **Saturday, July 27, 6:29 a.m.,** Moon in last quarter; 11:50 p.m., Moon passes Jupiter. **Sunday, July 28, 1:47 a.m.,** Moon passes Saturn. **Wednesday July 31, 4:22 p.m.,** Moon passes Venus. (From western U. S. and Canada, Venus will be hidden by the moon between 2:00 p.m. and 3:00 p.m., Pacific Standard Time.)

Eastern Standard Time throughout.

Science News Letter, June 29, 1940

PHYSICS

Cosmic Ray Particles Mostly Die on Trip to Earth

Mesotrons Are So Short Lived That Although They Travel 180,000 Miles a Second Many Die in 12,000 Feet

THE minute particles known as mesotrons, which are formed high in the air when the atmospheric atoms are struck by cosmic rays from outer space, die for the most part before they reach the ground. New evidence of this rapid decay has been obtained by Dr. R. A. Millikan of the California Institute of Technology, in collaboration with Dr. H. V. Neher and Dr. H. G. Stever, Dr. Neher told members of the American Physical Society meeting with the American Association for the Advancement of Science in Seattle.

Mesotrons are similar to electrons, but about 150 times heavier. They start with a speed of some 180,000 miles per second, nearly as great as that of light. Yet, so short-lived are they, that in traveling 12,000 feet, about 15% of them disintegrate spontaneously. From this it is calculated that they live, on the average, about 66 millionths of a second. In accordance with one of the consequences of the theory of relativity, an object moving at such a high speed shows a longer life than if it were at rest. The life of the mesotron at rest is calculated to be only

approximately 2.5 millionths of a second.

The scientists measured the intensity of the cosmic ray effects in two mountain lakes, one about 12,000 feet higher than the other, yet geographically close. In the upper lake, the apparatus was immersed about 12 feet deeper, so as to compensate for the fact that there was less air above this one. Thus, the total combined air and water absorption for each was the same.

Despite this, the readings in the lower lake were 15% lower than in the upper one. Dr. Millikan has concluded, therefore, that this is due to the fact that, in the extra time required for the mesotrons to reach the lower level, more have died. A life, at rest, of 2.5 millionths of a second, the same as that obtained theoretically, would give this difference.

Science News Letter, June 29, 1940

ENGINEERING

Cold Walls Get Dirty Faster Than Warm Ones

IF YOU want to keep the walls of your house clean, keep them warm. This advice is suggested from researches carried out by R. A. Nielsen, research engineer of the Westinghouse Electric and Manufacturing Company, described before the meeting of the American Society of Heating and Ventilating Engineers.

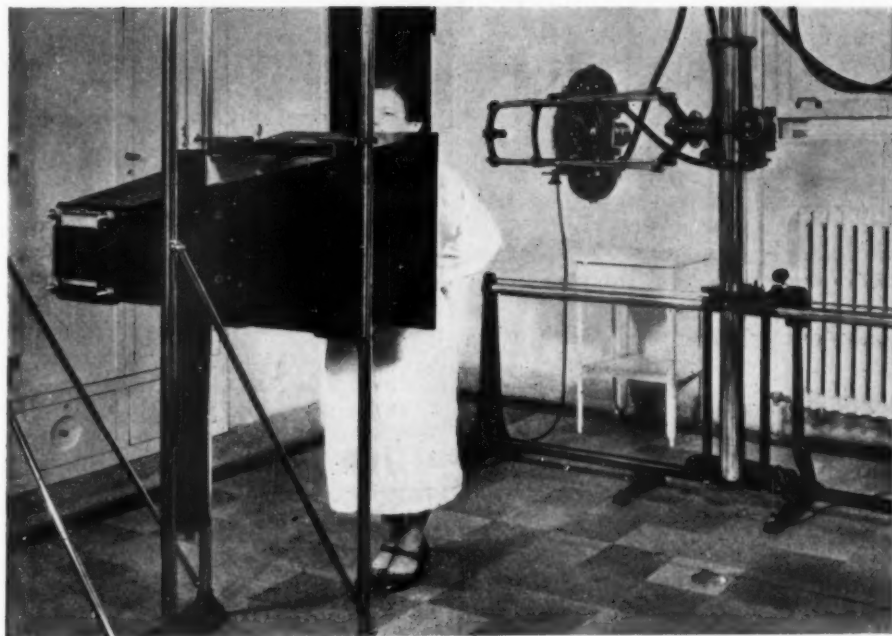
He investigated dirt distribution in suburban Pittsburgh homes during the winter, measuring wall temperatures with electric thermometers. "Thermal precipitation" is the name given to the effect, which often results in walls showing a pattern of the laths and framing behind them.

The molecules of oxygen and nitrogen in the air are in constant motion, the faster the higher the temperature. When the wall is warm there is a layer of warm air next to it, and these molecules move faster than those nearer the center of the room. Thus, they keep the dirt particles away. But when the room is hotter than the wall, Dr. Nielsen finds, the molecules near the cool wall are moving more slowly, and the dirt particles are driven against it.

Since the laths hold heat better than the plaster, the wall over the laths is somewhat warmer than the spaces between. Thus, the majority of the dirt particles are driven against the cooler regions, and a pattern of the laths is formed.

Science News Letter, June 29, 1940

Oiticica oil from a nut of a Brazilian tree is a rival of tung oil in the paint and varnish industry.



CHEAP X-RAYS

X-ray pictures only 4 by 5 inches, instead of the usual 14 by 17 inches, are now made by a Detroit hospital. Instead of letting the X-rays themselves fall on the film, and make the picture, they impinge on a 14 by 17-inch fluorescent screen, of the type used in making X-rays visible. The image on the screen is recorded photographically by a rigidly attached and permanently focussed camera, using an F. 1.5 lens. Lead glass installed within the assembly, in front of the lens, prevents the X-rays from reaching the film and fogging it. Advantages are reduced cost of film, as well as of processing and filing, making it possible to serve more patients on a limited budget. It is made by the General Electric Co.

PUBLIC HEALTH

Program For National Defense On Health Front Presented

A PROGRAM for national defense on our most vital and vulnerable front is presented to the American people. It is presented, not by a military

or naval authority, not by a statesman nor a politician, but by a man who has led millions of Americans to knowledge of scientific ways of fighting for life.

That man is the scientist-writer, Paul de Kruif. The program for national defense is the non-controversial national health program presented in his book, *Health Is Wealth* (Harcourt, Brace and Company).

The present threat of war does not lessen the need for enactment of a national health program. This is clear from the report of Colonel Lloyd B. Magruder, U. S. A., recruiting officer of the second corps area, that 32% of the young men volunteering for Army service in May had to be rejected as physically unfit to serve in the nation's defense and that 60% of those volunteering from urban centers will have to be rejected for health and other reasons.

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SCIENCE NEWS LETTER

2101 Constitution Ave. Washington, D. C.

Vast sums are about to be spent for tanks and guns and planes to defend the nation. Many will cry that this is no time to spend money on a health program. Tanks and guns and planes, however, cannot defend a nation by themselves. Men are also needed, men whose strength has not been sapped by "hidden hunger", whose hearts have not been crippled by rheumatic fever in childhood, whose lungs have not been damaged by tuberculosis. A program for the health of the nation is part of a program for its defense.

The cost of such a program, as presented by Mr. de Kruif, will save money in the long run by cutting the nation's bill for hospitalization of the mentally sick, the tuberculous, the crippled and for support of their families. Enough might even be saved to pay for part of the cost of the defense program now under way.

When Mr. de Kruif wrote his book, America had not started preparing to defend what the founders of the republic wrote into the Constitution as inalienable rights: Life, Liberty and the pursuit of Happiness. We may need again as in the past to protect those rights at the point of the gun.

In war or peace, however, we need also to protect the first of those rights with the weapons of the doctor and the

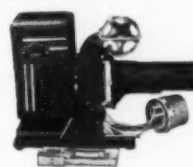
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health man: toxoid to defend life against diphtheria, sulfapyridine and serum to defend life against pneumonia, the surgeon's knife and X-rays and radium to defend life against cancer, vitamins to defend life against the "hidden hunger" starvation. To guarantee these rights to every American, we must push our program for national health, Mr. de Kruif says.

The program he presents is not likely to meet with any opposition from the American Medical Association. It was drawn up by five Michigan physicians, three of them, Dr. Henry A. Luce, Dr. Thomas K. Gruber and Dr. L. G. Chris-

tian, members of the House of Delegates of the A.M.A., and the other two, Dr. Henry R. Carstens and Dr. A. S. Brunk, officials of the Michigan State Medical Society. All the features of a health program for which the A.M.A. has fought, maintenance of the doctor-patient relation, lack of regimentation of doctors, provision for high quality of medical care, administration by a federal Department of Health, are provided in this national health program.

It has the approval of Dr. Thomas Parran, Surgeon General of the U. S. Public Health Service.

Science News Letter, June 29, 1940

PSYCHOLOGY

Hitler's Success Attributed To Personality Factors

Research Urged on What Brings Some Persons to Fame And What Environmental Factors Hold Back Genius

HITLER'S present place of victory in Europe, is not to be explained by any extraordinary mental endowment, Prof. Lewis M. Terman, psychologist of Stanford University, told the Pacific Division of the American Association for the Advancement of Science, in his address as their retiring president.

The "phenomenon called Hitler" is to be explained instead, he declared, "in terms of personal frustrations, displaced hatreds and fanatical aggressions."

Urging research on what it is that brings some men to eminence and what environmental factors are hindering so many geniuses from becoming eminent, Prof. Terman said that "these questions are of such transcendent importance that they should be investigated by every method that promises the slightest reduction of our present ignorance.

"So little do we know about our available supply of potential genius, the environmental factors that favor or hinder its expression, the emotional compulsions that give it dynamic quality or the personality distortions that make it dangerous! And viewing the present crisis in world affairs who can doubt that these things are potent factors in deciding the fate of a civilization?"

Prof. Terman himself has been following the achievements of 1300 gifted children whom he tested when they were school children. These young geniuses, now ranging in age from 22 to 37 years, include many, he said, who are intellectual equals of Washington and some who are intellectual equals to Napoleon, the most eminent man of history. Yet he does not foresee for them any comparable eminence.

"I regard it as unlikely that more than a few score of my 1300 subjects will attain to a national reputation or that more than a half-dozen or so will become really eminent. It would be surprising if even one of them a hundred years hence should be found among the thousand most eminent persons of history."

The great economic depression was mentioned by Prof. Terman as among the factors which have served to hinder these young intellectual giants.

"It has made harder the way of many and has diverted some permanently from their original goals."

Yet, although the group is still one of young people, they have already made a considerable contribution to society. About 50 of the men and a dozen of the women are teaching in colleges or universities. Seven are already executive heads of departments.

They have published hundreds of articles in professional or technical journals, at least 20 books and a vast number of short stories, popular articles, and poems. Eighty or more patents have been issued to them.

Science News Letter, June 29, 1940

ENGINEERING

Steel Welding Process Produces Fireworks

See Front Cover

THE COVER illustration this week shows not a Fourth of July display, but what happens during the flash welding of two pieces of steel, in the General Electric plant at Lynn, Mass. Two semi-circular pieces are being welded into a magnet frame for a direct current motor. Asbestos curtains restrict the flight of the sparks.

Science News Letter, June 29, 1940

The first known *artificial eyes* were made for Egyptian mummies and statues.

Most of the world's *radium* comes from two widely separated regions—Canada and the Belgian Congo.

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● Earth Trembles

Information collected by Science Service from seismological observatories resulted in the location by The Coast and Geodetic Survey of the following preliminary epicenter:

Tuesday, June 18, 1:39 p.m., EST

North of Attu Island in Bering Sea. Latitude, 50 degrees north. Longitude, 173 degrees east.

For stations cooperating with Science Service, the Coast and Geodetic Survey, and the Jesuit Seismological Association in reporting earthquakes recorded on their seismographs, see SNL, Feb. 24.

MEDICINE

X-Ray Spray Gives Better Treatment For Leukemia

Nobel Prize Winner Announces New Treatment for Invariably Fatal Ailment; Patients Live Longer

OPTIMISTIC progress in combatting chronic leukemia was announced at the meeting of the American Medical Association.

A better method of treating patients with this invariably fatal ailment was reported by Dr. William P. Murphy, of Boston, who shared the Nobel prize in medicine in 1934 for his work leading to the liver treatment for saving patients with pernicious anemia.

Dr. Murphy has not succeeded in curing leukemia, but he reports that with the treatment he developed patients live a little longer and much more comfortably. The women in his series of cases were able to continue with household duties, one of the men continued his ministerial duties, and most striking of all, perhaps, a bus driver who had arthritis as well as leukemia was able, after treatment for both conditions, to do hard labor for three or four years without undue fatigue.

The treatment Dr. Murphy advised fel-

low physicians to adopt consists in "spraying" the body with small doses of X-rays from a distance. X-ray treatment has long been used for this condition, but the rays have generally been directed in large doses to the spleen and bone marrow, where blood cells are formed.

Leukemia is characterized by excessive numbers of white cells in the blood. The intensive X-ray treatment has usually made the patients so miserable with nausea and loss of appetite and weakness due to sudden decrease in number of white blood cells that they usually dread the treatment and wait until they are in desperate condition before taking it. Smaller doses of X-rays given more frequently and by the "spray" technic over large areas of the body is not so hard on the patient and controls the disease better, Dr. Murphy found. The frequency of treatment, he said, should be determined by blood tests and the patient's general condition.

Chronic leukemia, he believes, results

from a lack of some substance necessary for the maturing of white blood cells or their origination in much the same manner as pernicious anemia results from a deficiency of some substance concerned in red blood cell production. This is shown by the way in which the white cells respond to X-ray treatments of small dosage. The deficient factor in leukemia is supplied in some manner by the X-rays in small doses, probably less satisfactorily by large doses which may also destroy cells.

Science News Letter, June 29, 1940

PHYSICS

America's 16th Cyclotron To Be Built At Illinois

AMERICA'S sixteenth cyclotron will be built at the University of Illinois.

The new machine at Illinois will be rated at 10,000,000 to 30,000,000 electron volts acceleration. An older Illinois cyclotron is rated at 1,000,000 volts.

The new cyclotron will be somewhat smaller than any of the 15 others now in operation or under construction, but roughly equivalent to any in results. It will send out atomic particles at speeds of 20,000 to 40,000 miles per second. That is more than one-tenth the speed of light.

A cyclotron is used for studying the composition of matter by smashing atoms. It is also used in the production of artificially radioactive substances. These are used in research in physics, chemistry, and biology.

Prof. P. Gerald Kruger, who built the University's small cyclotron in 1936, also is in charge of the new machine. Its bulkiest part will be an electromagnet with a 60-ton iron core. The magnet will be wound with two miles of copper bar which will weigh 10 tons. It will be supported on a 37-ton concrete foundation.

Construction will take at least a year. The machine will cost \$31,500. Radiations from it will equal those from 300,000 grams (600 pounds) of radium, which would be worth, if it existed, \$6,000,000,000, nearly equal to the value of all the homes, personal property, and passenger automobiles in the State of Illinois.

Prof. Kruger spent the last half of 1939 working in the University of California at Berkeley laboratory of Prof. E. O. Lawrence, who was awarded the 1939 Nobel prize in physics for his development of the cyclotron. There Prof. Kruger studied the effect of cyclotron-bombarded materials upon cancer.

Science News Letter, June 29, 1940

ERRATA, Vol. 37, Nos. 1-26, January-June, 1940

PAGE	TITLE BEGINS	CORRECTIONS
8	Salmon Taken For a Ride	Par. 1, lines 5-7 to read: below the Rock Island Dam, in the Grand Coulee area, to favorable points for laying their eggs in the upstream waters of 4 streams emptying into the Columbia River below Grand Coulee Dam.
9	Ancient Eskimos	Line 1, Alaska for Canada
20	Federal Health Service	Line 9, R. Cox for E. Cox
24	Three New White Dwarfs	Heading: Read Per Cubic Inch
35	Find New Weapon Against	Line 4, Delete initial B.
36	Find New Weapon Against	Col. 1, Delete last paragraph
36	Discovery Refutes Report	Par. 9, line 5, acids for acidos
56	Anti-Bleeding Property	See SNL, Mar. 9, 1940, p. 153.
58	Five Evening Stars	Par. 2, line 4, read turning from west to east.
60	Diesel Airplane	Par. 2, line 2, delete and Holland.
79	Oil Discoveries	Par. 3, line 3, air-cooled for new liquid-cooled
88	Gas from Apples	Line 1, To for So
105	Metallic Sodium	Par. 3, line 8, after ethylene period. Delete rest of sentence
122	Planets Still Bright	Line 6, to read: exposed to water the hydrogen produced often bursts into flame.
135	Ideas	Par. 2, line 11, oxygen for hydrogen
143	Power House	Col. 3, line 13, 1752 for 1758
154	New Written Language	Caption, Dr. Floyd C. Turner for Dr. Floyd C. Taylor
185	Press in Airplane Plant	Par. 2, line 1 to read: Discussing for the American Institute of Electrical Engineers
232	Bomb Sight is Patented	Col. 3, delete Par. 2
255	Physiology	Line 10, after stretched insert is clamped between two rows of jaws. A form of the desired shape
277	Academicians	Par. 2, line 4, Estoppey for Estoppy
299	Virus Disease	Head should read Psychology, Psychiatry
303	New Theory	Caption, line 15, F. Jones for R. Jones
307	What About Atomic Power	Line 4, read, traced to either a virus origin or a genetically transmitted abnormality
344	Armor for British Tommy	Col. 3, line 3, 10 billion for 10,000
380	Negro's Ability to Stand	Col. 2, par. 4, line 5, F. Joliot for J. Joliot
319	Telefact	Line 7, Kenneth for Kenenth
		Par. 2, line 5, Winston for Winton
		Par. 8, delete line 4. After explained, insert the man is "usually on the verge of exhaustion."
		Tortoise not mammal. Shown for comparison.

•First Glances at New Books

MILITARY SCIENCE

THE ART OF MODERN WARFARE—Hermann Foertsch—*Veritas Press*, 273 p., illus., \$2.75. Predictive of any of the events of the fast moving days following May 10, this translation by Theodore W. Knauth of a book by a colonel of the German general staff, with introduction by Maj. George Fielding Eliot, is timely for a world menaced by the art of war.

Science News Letter, June 29, 1940

TECHNOLOGY—DICTIONARY

NEW AUTOMOTIVE DICTIONARY, Part I. English-Spanish—The Lawyers' & Merchants' Translation Bureau, comp.—*Steckert*, 154 p., \$2.

Science News Letter, June 29, 1940

BOTANY

MANUAL OF CULTIVATED TREES AND SHRUBS, Hardy in North America (2d. ed.)—Alfred Rehder—*Macmillan*, 996 p., \$10.50. Indispensable to teachers and workers in horticulture, this book amply justifies its appearance in a new edition.

Science News Letter, June 29, 1940

BIOLOGY

THE CONTROL OF ORGANISMS—Friedrick L. Fitzpatrick—*Teachers College, Columbia Univ.*, 334 p., illus., \$2.75. Plants and animals are beneficial or dangerous, servants or enemies, largely in proportion to man's ability to use or control them. Written from this point of view, this book will give a fresh angle to biological studies, and offer fresh interest to the serious general reader.

Science News Letter, June 29, 1940

BOTANY

THE ENIGMA OF THE ORIGIN OF MONSTROSITY AND CRISTATION IN SUCCULENT PLANTS—J. J. Verbeek Wolthuys; translation by J. A. Schuurman—*Van Riemsdyck*, 73 p., illus., \$1. Succulents, perhaps because of the very thickening in stems and leaves necessitated by their way of life, seem to be peculiarly susceptible to fasciation, cristation and other morphological abnormalities. This well-illustrated brochure presents a careful study of some phases of the problem.

Science News Letter, June 29, 1940

BIOLOGY—PSYCHOLOGY

MORPHINE ADDICTION IN CHIMPANZEES—S. D. S. Spragg—*Johns Hopkins Press*, 132 p., \$1.75 (Comparative Psychology Monographs, Vol. 15, No. 7, April, 1940, Serial No. 79)

Science News Letter, June 29, 1940

PUBLIC HEALTH

HEALTH IS WEALTH—Paul de Kruif—*Harcourt, Brace*, 246 p., \$2. See p. 409.

Science News Letter, June 29, 1940

ETHNOLOGY

COSTUMES AND TEXTILES OF THE AZTEC INDIANS OF THE CUETZALAN REGION, PUEBLA, MEXICO—Donald Bush Cordry and Dorothy M. Cordry—*Southwest Museum*, 60 p., illus., \$1. (Southwest Museum Papers, no. 14)

Science News Letter, June 29, 1940

ANTHROPOLOGY

PENOBSCOT MAN, the Life History of a Forest Tribe in Maine—Frank G. Speck—*Univ. of Pennsylvania Press*, 325 p., illus., \$4. An anthropologist who has traveled and camped with this Algonkian tribe of New England describes its woodland life with scientific detail, yet in non-technical and readable style.

Science News Letter, June 29, 1940

PSYCHOLOGY

LOVE AT THE THRESHOLD, A Book on Dating, Romance, and Marriage—Frances Bruce Strain—*Appleton-Century*, 349 p., \$2.25. A book of motherly advice for young people and their parents.

Science News Letter, June 29, 1940

MATHEMATICS

COLLEGE ALGEBRA—Charles H. Sisam—*Holt*, 395 p., \$1.90. A new text by the professor of mathematics at Colorado College.

Science News Letter, June 29, 1940

BOTANY

PLANT MICROTECHNIQUE—Donald Alexander Johansen—*McGraw-Hill*, 523 p., illus., \$4.50. There can never be too much information on the preparation of botanical material for the microscope, until the last secret of its inner life has been wrested from the last plant. Every college department of botany that pretends to give adequate training in laboratory methods will need a copy of this book for its reference shelf.

Science News Letter, June 29, 1940

CHEMISTRY

THE CHEMIST AT WORK—Roy I. Grady, John W. Chittum and others—*Journal of Chemical Education*, 422 p., \$3. Fifty-two successful chemists, working in practically all branches of the science, describe their jobs, making this book of particular interest to the boy, or girl, who is thinking of chemistry as a career.

Science News Letter, June 29, 1940

ASTRONOMY

AN INTRODUCTION TO ASTRONOMY (2d. ed.)—Robert H. Baker—*Van Nostrand*, 315 p., \$3. Such advances of the past five years as the discovery of the 10th and 11th satellites of Jupiter, new knowledge of the galactic system and external galaxies, the conclusion that most of the "star clouds" in the Milky Way are really windows in the clouds of galactic dust, etc., are added. Excellent illustrations and diagrams increase the value of the book, not only to the student taking a formal course, but also to the layman desiring an authoritative summary of our present concepts of the universe.

Science News Letter, June 29, 1940

MATHEMATICS

A NEW GEOMETRY FOR SECONDARY SCHOOLS—Theodore Herberg and Joseph B. Orleans—*Heath*, 402 p., \$1.36. By departing from the conventional division of a geometry text into books, by showing in many instances the relation to arithmetic, algebra and numerical trigonometry, by applying what is taught to life situations, the authors of this new text have produced a book which should go far toward arousing a real interest on the part of the student.

Science News Letter, June 29, 1940

CHEMISTRY

THINGS A BOY CAN DO WITH CHEMISTRY—Alfred Morgan—*Appleton-Century*, 288 p., illus., \$2.50. By describing actual experiments that a boy can perform in his home laboratory, and the application of these in many practical ways, this book should start many a young chemist on his career.

Science News Letter, June 29, 1940

METALLURGY

A DICTIONARY OF METALS AND THEIR ALLOYS, Their Composition and Characteristics—F. J. Camm, ed.—*Chemical Pub. Co.*, 245 p., \$3. The publishers state that this is the first alphabetically arranged dictionary of metals and their alloys yet published. Every known metal and almost every type of commercial alloy is mentioned.

Science News Letter, June 29, 1940

ANIMAL HUSBANDRY

PROFITABLE POULTRY KEEPING—H. Clyde Knandel—*Orange Judd*, 462 p., illus., \$3. A new textbook in poultry husbandry, unusually complete and thorough in its treatment.

Science News Letter, June 29,

